MATH 150
Sample Exam 1
Answer Key

Created Summer 2003
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1. Simplify $(3 - i) / (-9 + 3i)$.
   a. −1
   b. −1/3   **
   c. 3
   d. i − 3
   e. none of the above

2. Simplify $i^{45} * i^{122} * i^{321}$.
   a. i
   b. −1
   c. − i
   d. 1   **
   e. none of the above

3. What is the center of the following circle: $2x^2 + 2y^2 + 12x - 16y + 18$
   a. (3, 4)
   b. (-3, 4)   **
   c. (-6, 8)
   d. (6, 8)
   e. none of the above

4. The equation of the line through the points (-8, 6) and (2, 5) is:
   a. 5.2x − 0.1
   b. −0.1x − 5.2
   c. −0.1x + 5.2   **
   d. 5.8x + 0.1
   e. 0.1x + 5.8

5. Which of the following is a Y-intercept of: $2x^2 - 5x - 12$?
   a. −12   **
   b. −4
   c. −3/2
   d. 3/2
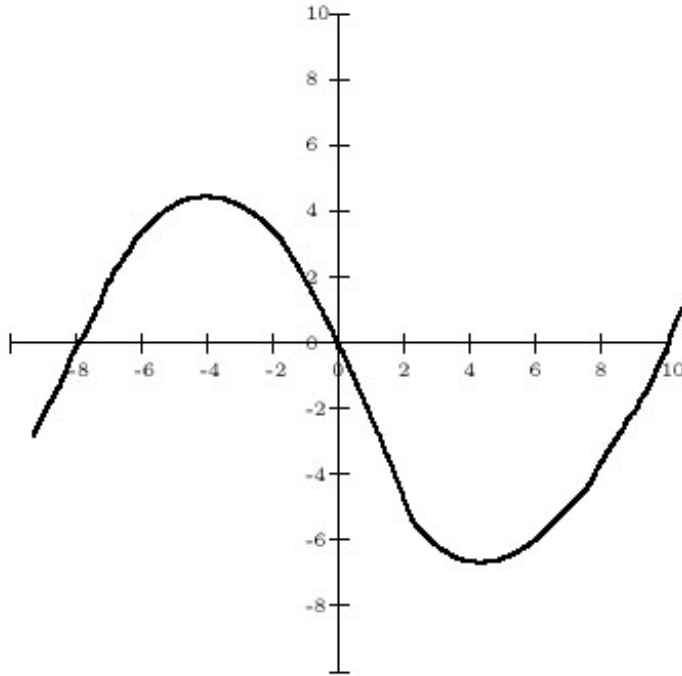   e. none of the above

6. Which of the following is an X-intercept of: $2x^2 - 5x - 12$?
   a. −12
   b. −4
   c. −3/2   **
   d. 3/2
   e. none of the above

7. Solve $| x/3 - 4/5 | \geq 2/3$
     a. [2/5, 22/5]
     b. [1/3, 9/7]
     c. $(-\infty, 1/3] \cup [9/7, +\infty)$
     d. $(-\infty, 2/5] \cup [22/5, +\infty)$ **
     e. none of the above

8. One interval on which the below graph of f(x) is always increasing is:

     a. (-4, 4)
     b. (-8, 0)
     c. (0, 10)
     d. (-8, -4)   **
     e. (-4, 0)

9. What type(s) of symmetry does the following equation have, $3x^7 - 6x^5 + 4x^3 + 5x$?
     a. origin symmetry   **
     b. y-axis symmetry
     c. x-axis symmetry
     d. both a and b
     e. both b and c

10. A 21 ft by 21 ft square swimming pool is surrounded by a path of uniform width. If the area of the path is 184 sq ft, find the width of the path.

The image you would use would be something like:
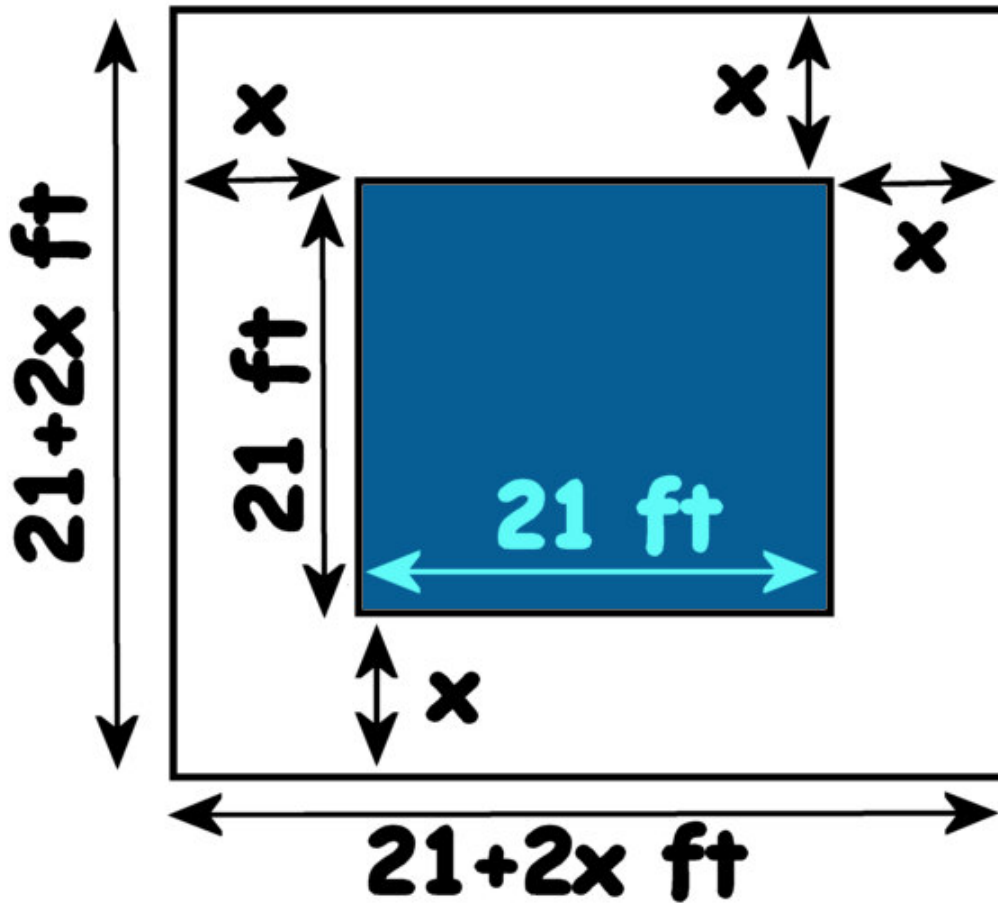
You know the area the pool (the blue square) is 21*21 = 441 sq. feet.
You know the area of the outside path is 184 sq. feet.
You should see that
[the area of the path] = [the area of the big square] – [the area of the pool]

184	**=**	$(21+2x)^2$	**– 21*21**
184	**=**	$441 + 84x + 2x^2$	**– 441**
0	**=**	$4x^2 + 84x - 184$	
0	**=**	$x^2 + 21x - 46$	
0	**=**	$(x - 2)(x + 23)$	

So the only valid answer is x = 2 ft = width of the path.

11. Find ALL (including complex) solutions to: $(3x^2 - 5)^2 = 49$.
   Hint: What squared equals 49?

Notice $7^2 = 49$, so first set:
$$(3x^2 - 5) = 7$$
$$3x^2 = 12$$
$$x^2 = 4 \qquad \rightarrow \qquad x = 2 \text{ or } -2$$

Notice also $(-7)^2 = 49$, so set:
$$(3x^2 - 5) = -7$$
$$3x^2 = -2$$
$$x^2 = -2/3 \qquad \rightarrow \qquad x = i*sqrt(2/3) \text{ or } -i*sqrt(2/3)$$

Recall sqrt(2/3) can be 'normalized' to sqrt(6) / 3

So the final answer is:

$x = 2, -2, \text{ sqrt(6)}*i / 3, -\text{sqrt(6)}*i / 3$